DoD Policy:
Economic
Analysis

COMMANDERS DIGEST

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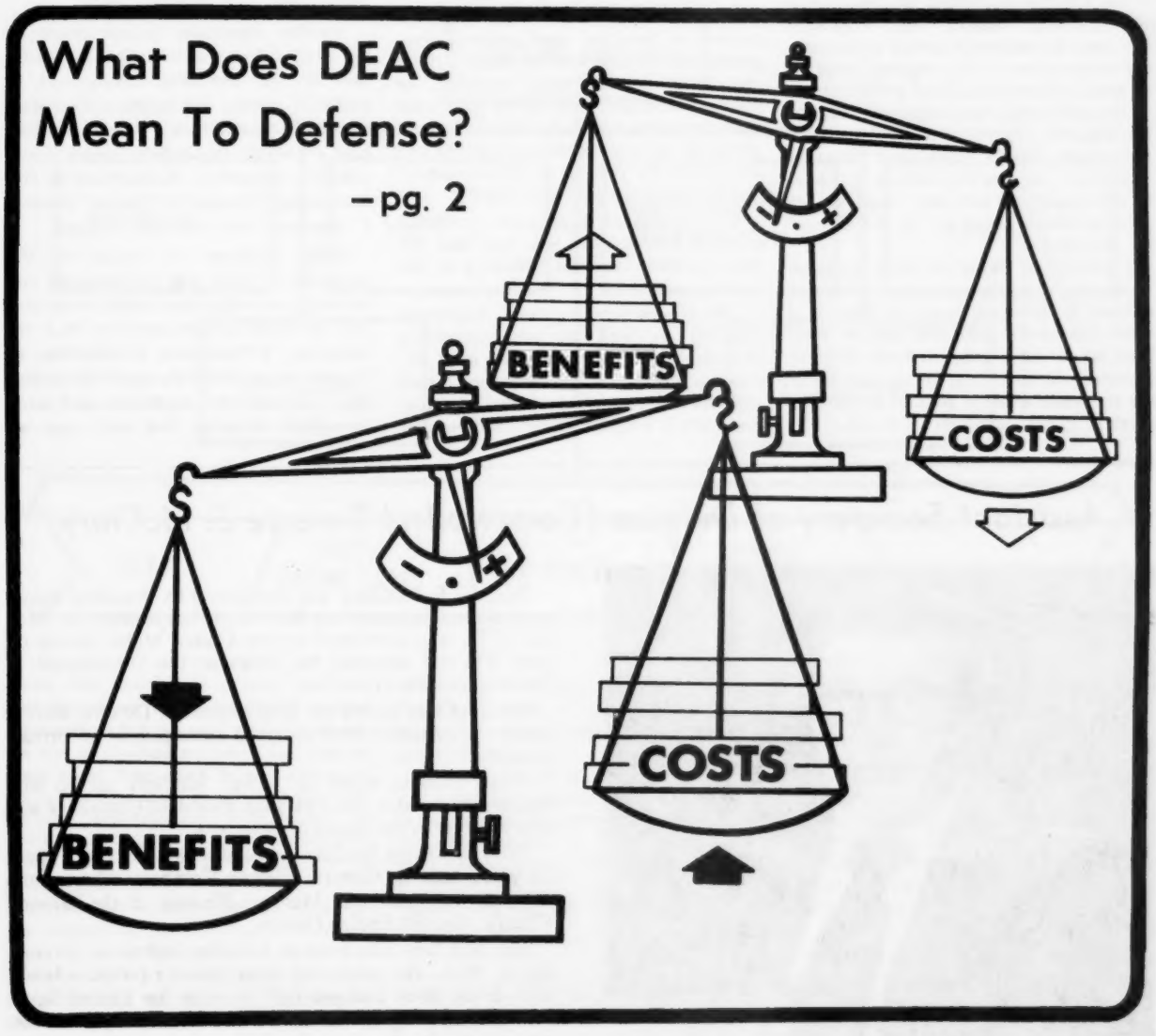
What Does DEAC Mean To Defense?

—pg. 2



Commanders' Checklist for Analytical Review —pg. 7

Includes Program Evaluation

The Defense Economic Analysis Council

By
Hon. Terence E. McClary
Assistant Secretary of Defense
(Comptroller)

The Defense Economic Analysis Council (DEAC) charter was expanded this year to include program evaluation, the examination of an ongoing program or project based on actual performance.

The publication and implementation of the Otcober 18, 1972, revision to DoD Instruction 7041.3 established program evaluation, or post-expenditure analysis, as the equal to economic analysis, or pre-expenditure analysis, in the charter for the DEAC.

I expect the DEAC to bring program evaluation up to the acceptance level now enjoyed by economic analysis. Since it is a new area and a most vital one, we shall have to devote a good deal of effort to fostering its use, but we cannot allow the economic analysis portion of the program to backslide while we do so.

Program evaluation has the support of the President, as evidenced by his May 25, 1970, memorandum entitled "Program Evaluation," and recently by his 1973 Budget Message to Congress.

"Increased emphasis will also be placed on program performance. Programs will be evaluated to identify those that must be redirected, reduced, or eliminated because they do not justify the taxes required to pay for them. Federal programs must meet their objectives and costs must be related to achievements," the President reported to Congress.

The importance of program evaluation was also reflected this year in a May 9th memorandum from the Secretary of Defense:

"Pre-expenditure analysis (economic analysis) as well as post-expenditure analysis (program evaluation) must become a routine for all managers. These analyses are prescribed by DoD Instruction 7041.3. I expect to see our thousands of managers, who collectively make tens of thousands of daily decisions on consumption of resources, concern themselves with the outputs and benefits derived from each decision made."

Another important change made by the revised Instruction is the incorporation of the individuals designated as points of contact for output information as members of DEAC. These members now constitute the benefit/output determination committee. A chairman for this committee, Lieutenant Colonel Herbert C. Puscheck has just been assigned.

DoD's analyses are based on the matching of costs and performance and therefore can only be as valid as the cost and performance information they incorporate. **Performance information, or if you prefer benefit/output determination, is an underdeveloped area and needs immediate attention. Not only must we**

Assistant Secretary of Defense (Comptroller) Terence E. McClary

Terence E. McClary

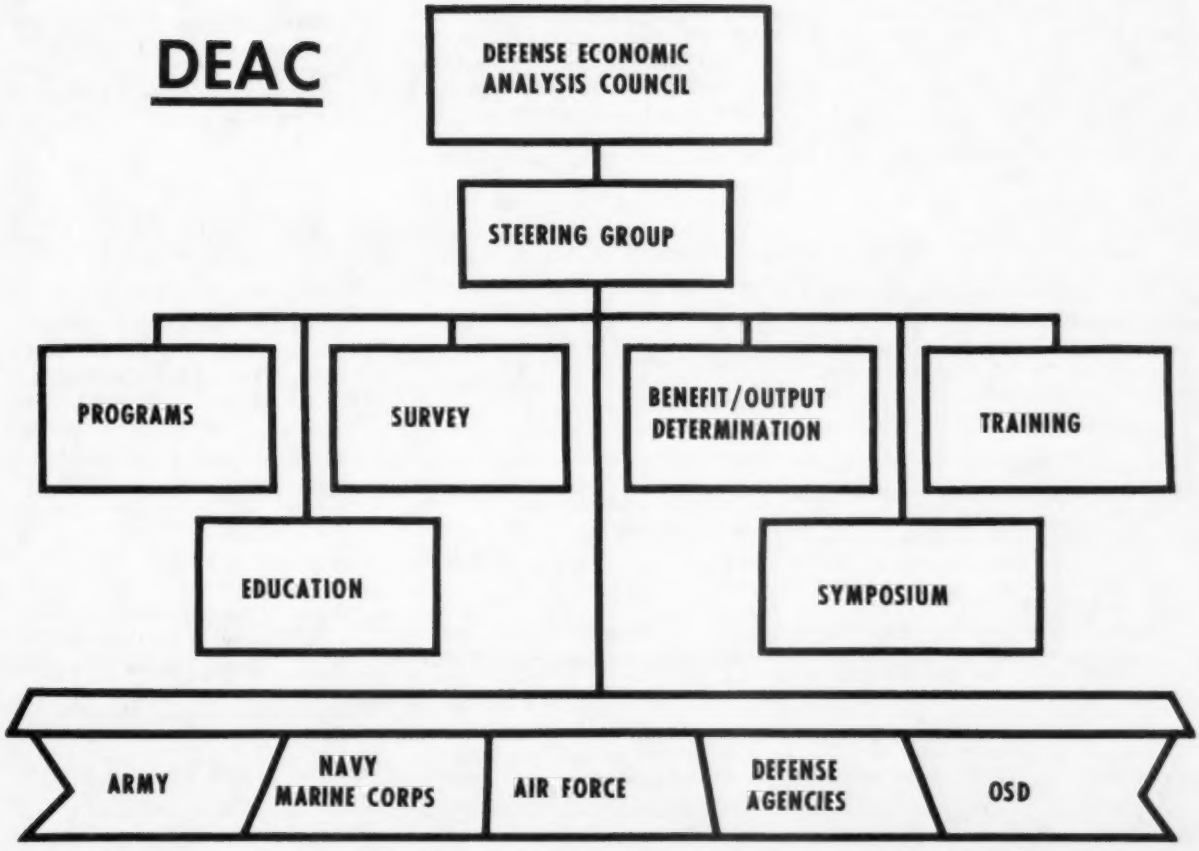
Terence E. McClary was nominated by President Nixon as Assistant Secretary of Defense (Comptroller) on May 22, 1973, was confirmed by the United States Senate on June 15, and assumed his duties at the Department of Defense on June 21.

Mr. McClary joined the Department of Defense after a career of executive-level financial management in private industry.

From 1969 to April 1973, Mr. McClary served with Sanders Associates, Inc., as Vice President-Controller and as a member of the Board of Directors.

Prior to joining Sanders Associates, Mr. McClary spent 20 years with the General Electric Company where, from 1964 to 1969, he was Manager-Finance of the General Electric Aircraft Engine Group.

Mr. McClary was born at Lincoln, Nebraska, December 1, 1921. He graduated from Lincoln public schools, and served three and one-half years in the United States Army, principally as first sergeant of an infantry rifle company in the Pacific area. In 1949, he received the degree of bachelor of science, business administration, with honors from the University of Nebraska.



move with alacrity to develop methods and technique for determining output information, but we must also discourage the use of slipshod measures that can do more harm than good. Invalid measures are worse than none at all since they can lead to complacency with failing or wasteful programs and to alarm with programs that are meeting schedule or even exceeding it.

Preliminary reports from DEAC's survey committee indicate that our major projects are subjected to analysis but that thousands of managers at the operating level do not enjoy the advantages offered by analysis. These are the very managers the Secretary of Defense directed attention to in his May 9 memorandum. We cannot expect these managers to have access to a staff of operations research experts. The analyses performed for them or by them must necessarily be unspohisticated but valid and accurate.

I expect DEAC to initiate efforts that will assist these managers and their staffs to develop the capability to perform analyses. This means that training programs must be designed for operating level managers that will concentrate on techniques and methods that can be used without extensive training. We must also monitor progress to insure that the tools, economic analysis and program evaluation, are in fact being exploited at the operating level.

DEAC must initiate an active program to inform all managers of these tools be incorporated into the DEAC's activities for the next few years. This must be more than a public relations effort. DEAC must be ready to assist those we convince. DEAC must monitor its efforts to insure that they are cost effective. Inefficient efforts can discredit the product.

The Secretary of Defense emphasized that he wanted analysis to become a routine procedure. There are several ways in which this council can pursue the objective of making analysis more of a habit with all managers:

- DEAC might establish a directory of those training courses, literature, films, etc., available within the Department and then insure that this directory is widely distributed.
- DEAC might insure that the advantages of analysis are convicingly put before managers at all levels, explaining what analysis

analysis offers these busy individuals, if we expect them to make use of these managerial tools. For instance, my office is publishing a treatise for operating managers entitled "Analysis for Managers of People and Things." It was available on November 19 and will be given wide distribution.

- DEAC should monitor progress. To do this, the council must provide for feedback to determine what it has done right and where it has failed.

I suggest the survey committee be retained as an active part of DEAC to continually monitor progress by selected, limited, questionnaires, by field visits, or by whatever other means available within your resource limitations. The survey committee's reports would also be of substantial benefit to my staff in directing their efforts.

The survey (page 9) provides an overview of what has been accomplished. The information it supplies constitutes a crest in our progress that allows us to look back and see where we started, to see the false trails and wasted effort, as well as the programs that achieved success. We can also use this crest to look ahead and plan our future course, if we will take the time and trouble to do so.

Other DoD Programs

The future of DEAC must encompass a wider view than merely more of the same. What are the relationships between analysis as promulgated by DoD Instruction 7041.3 and such other programs as Management By Objectives or the DoD Productivity Improvement Program? How does our form of analysis mesh with that required by other DoD Instructions issuances? What interplay is indicated and is possible between these techniques and the budget review process or internal audit? All of these should be included in the future activities of DEAC. Let me stress that DEAC should not work in these areas alone, useful progress can best be made in conjunction with the other organizations involved.

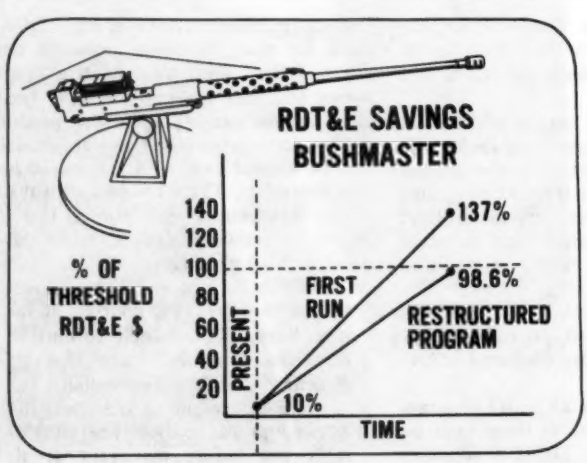
DEAC would do well to consider a symposium next year to review the results of the survey, to broaden the outlook for the future, and to discuss the plans of the benefit/output determination committee in an open forum. DEAC should work to incorporate voices from more than the headquarter's Comptroller society in Washington.

On September 18, Secretary Schlesinger asked me to oversee a series of studies designed to reduce overhead and support costs, to streamline management and realign the military base structure. The mission included seven specific areas. Task groups are now at work on them. Analysis can be of material assistance in this project. Output measures must be developed and managers taught and motivated to match these measures with costs. I suggest you select a support area, or maybe two, and work with the problem.

It looks like a busy year, an ambitious program for the DEAC, but not too ambitious. We can make substantial progress toward these goals, if we face them with conviction.

Economic Analysis Speakers Sought

The Defense Economic Analysis Council is compiling a shopping list of speakers on various, related topics. Do you know of good examples of outstanding applications of economic analysis, program evaluation, or output measurement concepts at the operating level? Would you be willing and able to share your experiences with others by appearing as a guest speaker at symposia, meetings or in the classroom? If so, send your qualifications and other specifics to Col. V. J. Klaus, Defense Economic Analysis Council Speaker's Bureau, OASD(C), Pentagon, 3B884, Washington, D.C. 20301.



PHASE 2 ICE PROGRAM (BUSHMASTER) JUNE 1970

Life Cycle Cost Estimate for Vehicle Rapid Fire Weapon System--Successor as defined in the QMR.

This study was originated from the Improved Cost Estimating Program (ICE) Policy of performing an in-depth cost analysis of each major system under development. At the time the study was initiated, approximately 10% of the established RDT&E threshold was sunk. Between the establishment of the threshold and the ICE study many additional requirements had accumulated (mainly data and test program increases) without an adequate assessment of the cumulative funding impact. Consequently, the first iteration of the computer model disclosed RDT&E projections that exceeded the threshold by 37%.

This disclosure of cost growth led to a restructuring of the program to eliminate many of the "nice to have" but not absolutely necessary requirements. This restructuring brought the RDT&E costs down within the threshold limits with no technical or performance degradation.

The study is being updated currently to reflect changes in the procurement plan.

Questions and Answers

AMC Works on 'Program Evaluation'

Brig. Gen. Leslie R. Sears Jr., USA, Comptroller, Army Materiel Command (AMC), in a recent interview with *Commanders Digest* explained how members of AMC have been working on improvements in the "Program Evaluation".

QUESTION:

General Sears, would you please give an overall viewpoint of how you feel the Army Materiel Command is responding to the points raised by Assistant Secretary (Terence E.) McClary's statement to the DEAC?

ANSWER:

This command has moved out vigorously in implementing the economic analysis and program evaluation program. Our integration of "pre-expenditure analysis" into day-to-day management decisions has shown visible results. Our activities in "post-expenditure analysis" have been wide-ranging. Personnel of this command have been working on improvements in the "Program Evaluation" area through an effort we call "closing the loop".

Once an economic analysis has been completed in the planning and programing phases, it's absolutely necessary to track the subsequent decisions and results through budget formulation and execution. Of course, on some projects, there have been difficulties in tracking results. This follows from the use of economic costs concepts as applied to estimates and the accounting cost concepts used in reports, while an-

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General Sears Serves as Army Materiel Command Comptroller

Brigadier General Leslie R. Sears Jr., was born in South Weymouth, Massachusetts, on January 18, 1928.

He served with the U.S. Navy as an electronic technician on the USS Boxer during 1946-48 and upon his discharge attended Boston University where he received his bachelor of science degree in business administration in 1950.

General Sears entered the Army in 1951 and was assigned as radar officer, 685th Anti-Aircraft Artillery Gun Battalion. After serving three years in Germany with USAREUR as an anti-aircraft artillery platoon leader and assistant finance officer, he attended the Finance Officers' Basic Course, Ft. Benjamin Harrison, Indiana.

Upon graduation he was assigned as Finance and Accounting Officer, Springfield Armory, Massachusetts. Two years later he became a student at the Harvard Business School, Boston, and in 1960 received his master's degree in business administration.

He was subsequently assigned as an automatic data processing systems staff officer, Office, Chief of Finance, Washington, D.C.

In 1963-64 General Sears attended the Command and General Staff College, Ft. Leavenworth, Kansas. After graduation he was ordered to Vietnam where he became Chief, Management Section, Office, Comptroller, U.S. Military Assistance Command, Vietnam.

Returning to the United States, General Sears served as member of the Department of the Army Board of Inquiry on Army Logistics Systems (Brown Board) from July 1965 until April 1967 at which time he was designated Chief, Cost Research Division, Office, Comptroller of the

Brig. Gen. L. R. Sears Jr., USA

Army (OCA). He was subsequently named Chief, U.S. Army Field Operation Cost Agency.

After graduating from the Industrial College of the Armed Forces in 1969, he became military assistant, Office, Assistant Secretary of the Army (FM). In June 1970, he was named executive officer, Office ASA (FM), and remained in that position until he was reassigned to OCA as Assistant Director of Army Budget (OMA) in July 1971.

General Sears was designated Comptroller, Headquarters, U.S. Army Materiel Command, Washington, D.C., on December 1, 1972.

other part of the problem relates to the use of imperfect measures of benefits. One area that immediately comes to mind is some of our efforts to enhance productivity.

It is difficult to separate, specify and assign values to all the factors that have impacts on productivity and then track these causes and effects through the reporting systems. We are continuing to work on it. I would say that this command is responding, has been responding very well to issues and policies covered by Secretary McClary's statement.

QUESTION:

Secretary McClary referred to the DEAC economic analysis (EA) survey and made the observation that all managers don't have access to operations research experts, and that this staff capability isn't necessary for the performance of valid and accurate analyses. Do you feel that AMC has developed a broadly based analytical capability?

ANSWER:

Yes. The command has accomplished several actions that are necessary to successful integration of EAs into daily management. In the first place, we have generally overcome misunderstanding of what needs to be done in applying economic analysis. Through various training activities such as Army Management Engineering Training Agency (AMETA), the Civil Service Commission, and our headquarters seminar teams, we have trained 436 headquarters and field personnel during FY 73 alone.

We have established that it is not intended to be a stereotyped technique, nor is it constrained by rigid procedures; we have established that there are a minimum of criteria that must be specifically adhered to; a minimum degree of rigorousness that should be present in almost all analyses.

We have established the emphasis on doing economic analysis to provide information that must be considered in the management decision process, with the degree and depth of analysis determined by the complexity of the task or project and the magnitude of its projected resource consumption.

Before going to another question, I'd like to take a minute to comment briefly on the recent extension of application of EA to on-going activities, which is directed by the revised DODI and AR. We, in AMC, established such a requirement in our 1971 Supplement to AR 37-13. I think it unfortunate, however, that another term, "Program Evaluation", has been coined to cover this application. This is bound to lead to a certain amount of confusion, particularly in light of the definition of "Program Evaluation," which starts out by stating that it's "economic analysis of ongoing actions," and then partially destroys this thrust by implying it's little more than traditional review and analysis.

We view this extension as a needed requirement to analyze our ongoing activities, considering changes and trends in the environment we must adjust to and new alternatives that may lead to more effective mission accomplishment within resource constraints.

By taking this approach we place application of economic analysis to both new proposals and ongoing activities on a comparable basis, and thus provide a means for establishing programs, as well as their component activities, "at the margin". In other words, at the point which optimizes benefits, in the sense of mission related output, in relation to costs.

QUESTION:

You state that economic analysis is integrated into AMC's management decision making process. How else is this being done?

ANSWER:

We've taken several steps to accomplish exactly those major goals mentioned by Secretary McClary. First, there are all those aspects of training and informing managers that I mentioned earlier. Secondly, there is the inclusion of requirements for economic analysis contained in policy statements by our command group; guidance and regulations within mission and support functional areas which have been published; and use by the Program Budget Committee (PBC) in considering proposed resource allocations.

One of the most visible examples is our handling of our military construction proposals over the last two years. We only had 46 percent initial coverage of 104 projects with economic analysis in our military construction [PBC] in FY 73. The [PBC] rejected unsupported projects which helped inject discipline into the analysis and justification procedure. This year we are striving for full coverage.

As you can appreciate, this kind of coverage has great motivating power. It's a very positive incentive. We've followed up on this thrust by issuing an Internal Review Guide on Economic Analysis which is used by our Internal Auditors and by applying our Quantitative Budget Analysis system to our budget development and execution throughout the year.

We've made a particularly significant contribution by developing an efficiency and effectiveness model using Defense Integrated Management Engineering System (DIMES) and productivity measures in our quantitative approach. Although this model doesn't adhere to all elements of an economic analysis, its use is another tool in our total program evaluation effort tying together manpower, dollars, workload and DIMES efficiency indexes to developing trends that provide an overlook of each activity and its major functions, i.e., supply, maintenance, etc.

Taken together, all of these activities provide this Command advanatges in identifying resources requirements, improvements in operations, and visible tracks of accomplishments.

DISCUSSION—Meyer Tartasky, Principal Deputy Comptroller, Systems Policy and Information, (left) and Calvin R. Nelson, Director for Program and Performance Measurement, both in the Office of the Assistant Secretary of Defense (Comptroller) talk over economic analysis.

Within DoD

New Booklet Focuses on Analysis at Working Level

A new booklet, published by the Office of the Assistant Secretary of Defense (Comptroller) and printed by the Government Printing Office, was written to focus analysis on the operating level within DoD. Dr. Ivon W. Ulrey, Professor of Economics, Navy Management Systems Center, Navy Postgraduate School and Dr. Ann P. Ulrey, Economist Consultant, Division of Research and Statistics, Board of Governors of the Federal Reserve Systems jointly authored *Analysis — For Managers of People and Things.*

Ulrey

Requests have already been received for thousands of copies of the booklet, and at the present rate, the first printing will be exhausted shortly. The Ulrey team has done for DoD commanders and operating managers what Henry Ford did for the American public many years ago, DECA officials said. They pointed out that while Mr. Ford brought the automobile within reach of most Americans, the Ulrey team has made the basic tools of analyses available, in simple straightforward language, to the thousands of operating-level commanders and managers throughout the Department of Defense.

In less than 100 easy-to-read pages, the authors explore the need for analysis in support of decisions, deal with some of the elementary techniques of analysis easily understood by even the non-mathematician types, and present three case histories based on real data.

Past failures to utilize data already available at the operating level have occurred to a large extent because many of the commanders or managers, who could benefit directly from the use of simple analytic techniques were unfamiliar with analysis and did not know how easily it can be applied to their problems. Past attempts to show managers and commanders how to utilize the available data have failed because the academic approach is frequently taken and often the more complex analytical procedures have been emphasized. This booklet focuses on the use of elementary analysis to assist operating managers and commanders in everyday utilization of operation and maintenance and military personnel resources in the Defense environment.

Analysis—For Managers of People and Things is divided into three parts. The first, "The Need for Analysis," draws a

For Reviewers

Commanders' Checklist on Analysis

A. THE OBJECTIVE, ASSUMPTIONS AND ALTERNATIVES

1. Is the problem stated the real problem?
2. Are all reasonable assumptions identified and explained?
3. Are assumptions too restrictive? Too broad?
4. Are intuitive judgments identified as such? Are uncertainties treated as facts? Can the facts be verified?
5. Are any feasible alternatives omitted?
6. Are the alternatives well defined and discrete? Do they overlap?

B. THE COST ESTIMATE

1. What costing method was used? Is it appropriate?
2. Are all relevant costs included? Are directly related support and training costs included?
3. Does the study indicate why certain costs were considered relevant and others not?
4. Are "sunk costs" excluded?
5. Are the sources of cost data included? Are they accurate?
6. Are the Cost Estimating Relationships valid, if the parametric method was used? Are extrapolations used without proof?

C. THE BENEFIT DETERMINATION

1. Does the analysis ignore some portion of total output?
2. Were the criteria used to measure benefit justified by the context of the study?
3. Was the benefit, in fact, unmeasureable? Has there been a rational assessment of non-quantifiable factors?
4. Was expert opinion used? Were these experts properly qualified?

D. SELECTING FROM ALTERNATIVES

1. Are the recommendations logically derived from the material?
2. Is interference from co-extensive or parallel operations ignored?
3. Are the recommendations feasible in the real world of political, cultural, or policy considerations?
4. Are the recommendations based upon significant differences between the alternatives?
5. Are recommendations intuitively satisfying and supportable?
6. Is an uncertainty analysis needed? Were the methods and sources of the study adequately documented?
7. Do benefits exceed costs for alternatives considered?
8. Were present value estimates used?
9. Are cost factors current and supportable?

sharp distinction between data and information. Data becomes information, the authors contend, when users are able to identify relationships that are relevant for decisions they are about to make. To achieve this end, data collectors, analysts, managers and commanders need to plan in advance what information is needed and how it will be used. In an operating environment, analysis is a continuing process, not a one-time project with a completion date.

Part II—the principal part of the book—discusses "Some Techniques of Analysis" and how to use them. It begins by showing how numbers may be arranged so that they "speak English" to the manager who uses them simply by displaying the right numbers at the right time in the right format.

Late sections of this part become somewhat more technical, but the emphasis remains entirely upon applying simple techniques to data that are already available or can feasibly be collected. The authors never depart from their practice of using everyday language to describe the economic concepts and quantitative methods that are discussed. This gives the book an "unacademic" flavor, which some may criticize, and also accounts for the deliberate omission of many important tools of analysis—such as the use of statistical probabilities for dealing with uncertainty.

In too many cases, those who have been "taught" sophisticated analytic techniques become frustrated when they attempt to transfer such tools from carefully tailored classroom abstractions to "real world" problems. In this book, on the contrary, the authors set out to "sell" analysis by showing managers how easy it often can be and how useful to them—if only in protecting themselves against misuse of the same numbers by others.

Part III consists of three examples of analysis at the operating level, each based on actual data for an operating activity. Each is written in dialogue form to help data collectors, analysts, managers and commanders see themselves as participants in a problem-solving process. The specific subjects are pharmacy store operations, pilot training and labor productivity measurement, but each example is applicable to a wide range of operations.

Copies of this booklet are available at $1.45 each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

As Decision Tool

DoD Analysis Program to Focus on Operating Managers

The program to increase the use of analysis as a decision-tool has enjoyed a modest success. Many forms of decision-making now specifically call for analysis, such as the analysis required for commercial and industrial activities (DoDI 4100.33), the analytical processes called for by the Defense Systems Acquisition Review Council, the budget guidance manual (DoD 7110-1-M), and the economic analysis and program evaluation instruction (DoD Instruction 7041.3).

Congressional support during budget reviews and the Presidential budget message of 1973 also support the analytical process. These promulgations have resulted in an ever increasing awareness and use of analysis. However, the analysis is performed by and large in areas such as weapon and support systems, alternative force levels, tradeoffs between force structure, force size, modernization and readiness, and the like.

These high dollar areas claim the lion's share of the analyses performed. However, the smaller dollar decisions at the operating level add up to sizeable portions of the DoD budget and promise significant savings, if we can improve the decision-making process at the operating level. This, in fact, is the focus for Defense Economic Analysis Council (DEAC) activities for the future.

The operation and maintenance appropriation, when combined with military personnel, constitutes more than 56 percent of the DoD budget. The opportunities for savings exist, and to fully exploit them we must substantially increase the use of analysis at the operating level. The Assistant Secretary of Defense made this very point in his October 31 speech to the DEAC when he said:

". . . Thousands of managers at the operating level do not enjoy the advantages offered by analysis."

Operating managers in their day-to-day activity form decisions that direct the expenditure of millions of dollars. Analysis can help these managers formulate better decisions. The problem is how to get an analytical capability to them and to motivate them to use it.

The first task is to convince managers that meaningful analysis can be performed without an Operations Research/Systems Analysis (ORSA) staff capability. A significant contribution can be made with the tools available in the DEAC Economic Analysis Handbook or in Dr. Ivon W. Ulrey's book, which is reviewed in this issuance. The DEAC handbook can be obtained by any DoD organization by writing to the Special Assistant for Education, Office of the Assistant Secretary of Defense (Comptroller), Washington, D.C. 20301, (no private return addresses please). Other aids are listed in the box on page 10.

The DEAC plans to run workshops in output measurement; it has formed a training committee to foster the use of analysis in training activities and the symposium scheduled for early 1974 will concentrate on the use of analysis by operating managers.

There are no plans for a new reporting system. The use of analysis is strongly recommended, but no one will be looking over the shoulder of operating managers to insure that it's used. Well, almost no one, the only check now planned was contained in the memorandum of the Secretary of Defense, dated May 9, 1973, on the subject of "Effective Management of Resources:"

"I ask each of you to initiate positive steps which will require economic analyses to become a part of the budget review process at all levels and to insure that all auditors monitor the application of program evaluation procedures. The decline in real purchasing power of the DoD budget, due to inflation and increased personnel costs, must be countered with increased effectiveness in the application of those resources entrusted to us."

Broadening Program

Economic Analysis Survey Measures Utilization

By
Colonel Edmund W. Edmonds Jr.
Assistant Comptroller of the Air Force

A committee of the Defense Economic Analysis Council (DEAC) was given the assignment to accomplish this survey with the assistance and cooperation of the DoD Survey Research Committee, OASD (Manpower and Reserve Affairs).

The purpose of the survey was to determine the extent of economic analysis in the Department of Defense, increasing the extent of the training, methodology and techniques used, projects undertaken, and the impact of utilization of resources.

Economic analysis and program evaluation for resource management are described in the Department of Defense Instruction 7041.3, dated October 16, 1972. Economic analysis is a systematic approach to the problem of choosing how to employ scarce resources and an investigation of the full implications of achieving a given objective in the most efficient and effective manner.

The determination of efficiency and effectiveness is implicit in the assessment of the cost effectiveness of alternative approaches and is accomplished by:

- systematically identifying the benefits and other outputs and costs associated with alternative programs, missions, and functions and/or of alternative ways for accomplishing a given program (usually referred to as projects and activities);
- highlighting the sensitivity of a decision to the values of the key variables and assumptions on which decisions are based, including technical, operational, schedule and other performance considerations;
- evaluating alternative methods of financing investments, such as lease or buy; and
- using benefits and costs to compare the relative merits of alternatives as an aide in making tradeoffs between alternatives, recommending cost-effective alternatives, and establishing or changing priorities.

Questionnaires were prepared in two parts: the Organizational Questionnaire (EAPES I); and the Individual and Personal Opinion Questionnaire (EAPES II). For the purpose of the survey, economic analysis was further defined as a systematic approach to comparing the cost and benefits of alternative courses of action. Program evaluation is defined as economic analysis of ongoing actions to determine how to improve an approved program/project based on actual performance. In this survey, both economic analysis and program evaluation are referred to as economic analysis.

The following should be considered as examples of some of the techniques used in economic analysis:

- cost benefit study,
- cost effectiveness analysis,
- cost/output tradeoff study,
- force structure analysis,
- operations research techniques,
- cost comparison of two or more alternative ways of accomplishing objective, and
- life cycle costing.

The survey was the result of Government Accounting Office (GAO) interest and Congressional inquiries on the use being made of economic analysis techniques throughout the Department of Defense. The committee specifically wanted to know the extent of use, the need for training, what types of projects

Colonel Edmund W. Edmonds Jr., Assistant Comptroller of the Air Force, holds a copy of the booklet "Analysis—For Managers of People and Things". (See review, page 7.)

COMMANDERS DIGEST

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were being analyzed, and what impact the system of economic analysis had on uses of resources. The organization questionnaire (EAPES I) is the official position of the organization on economic analysis. EAPES II (the individual questionnaire) was an attitude and opinion survey of individuals as they perceive the use and value of techniques in economic analysis in DoD. The survey was administered through command channels to the four Services and the DoD Agencies.

Organizations selected five persons to complete the individual questionnaires. Approximately 600 organizational questionnaires were answered and returned. Overall, of the 6,000 distributed, 3,300 questionnaires were returned; 51 percent participation was achieved. The following table shows the number of organizations, by functions, participating.

Functions	#	%
Communications or Transportation	30	5.0
Comptroller	84	14.1
Construction, Engineering, or Maintenance	65	10.9
Data Systems	6	1.0
Intelligence	15	2.5
Operations	36	6.0
Personnel or Plans	17	2.9
Procurement or Supply	63	10.6
Research and Development	39	6.6
Other (Medical, etc.)	75	12.4
Organizations with Various Functions	167	28.0
Totals	597	100.0%

The following table shows the number of individuals, by functions, participating in the survey.

Functions	#	%
Communications or Transportation	186	5.6
Comptroller	743	22.3
Construction, Engineering, or Maintenance	479	14.4
Data Systems	130	3.9
Intelligence	42	1.3
Operations	200	6.0
Personnel or Plans	224	6.7
Procurement or Supply	579	17.4
Research and Development	299	9.0
Other (Medical, etc.)	448	13.4
Totals	3,330	100.0%

The survey offers the analyst the possibility of many excursions. While the published report is basically raw data, here are some significant highlights.

Participation by Function

Organizational participation by function ranged from 1 percent in Data Systems to 14.1 percent in the Comptroller function. Individual participation ranged from 1.3 percent in Intelligence to 22.3 in the Comptroller function.

Focal Point for Economic Analysis

One half of the organizations surveyed have a central office which serves as a focal point for economic analysis.

Use as a Management Tool

A wide majority, 63.8 percent of the organizations and 71.2 percent of the individuals, stated that economic analysis is a useful management tool.

Availability of Resources

Approximately 58 percent of the organizational and 58 percent of the individual responses indicated there are not enough resources or trained personnel to perform economic analysis.

Budget Category

The utilization of economic analysis by budget category shows approximately 36 percent in Operations and Maintenance, 26 percent in Procurement, 23 percent in Military Construction, and 12 percent in Research and Development.

Economic Analysis Criteria

Approximately 58 percent of the organizations surveyed use both dollar level and type of proposal criteria in determining whether to use economic analysis; 3.8 percent use dollar level criteria only and 7.7 percent of the organizations use only the type of proposal criteria in determining whether to use economic analysis.

Utilizing Economic Analysis

Of the 576 organizations reporting, 151 (26.2 percent) had between 1 and 10 projects utilizing economic analysis during the last 12 months, 39 organizations (6.8 percent) had between 11 and 20 projects, 4 organizations (.7 percent)

Instructions

Implementing instructions are: DoD Instruction 7041.3, "Economic Analysis and Program Evaluation for Resource Management," October 18, 1972.

- **Army—AR 37-13**
- **Navy—SECNAVINST 7000.14A**
- **Air Force—AFR 172-2, pending revision**
- **NSA—NSA Resources Management Manual, Vol. II, Part C, Chapter II**
- **DIA—DIAR 45-8**
- **DNA—DNA Instruction 7041.3A**
- **DCA—DCA Instruction 600-60-1**
- **DSA—DSAR 7041.1**
- **DCAA—DCAAR 7041.1**
- **DMA—DMA Instruction 7041.3**
- **DARPA—ARPA Policies and Procedures Guide, Section 13**

Training Film/Video Tape Available

A Pentagon overview-briefing, on the subject of Economic Analysis and Program Evaluation, given to flag/general level officials, was recorded on video tape and transferred to color film. The briefing presents a common sense approach to the subject and includes several well-illustrated examples of practical application use by each of the military departments.

A more detailed description of the film (FR1398, "Pentagon Briefing—Economic Analysis") can be obtained from the Air Force Film Directory, Motion Picture Films (AFM 95-2). The film may be obtained from the USAF Central Audio-Visual Library, Aerospace Audio-Visual Service (MAC), Norton AFB, California 92409. The video tape may be obtained from the Hq. USAF Television Center, 1143 AB Sqd/AVT, The Pentagon, Washington, D.C. 20330 (Phone OXford 5-7317).

had between 81 and 100 projects, and 72 organizations (12.5 percent) had 100 or more projects utilizing economic analysis during the last 12 months.

Economic Analysis in Decision-Making

Responses from organizations show that 18.5 percent always use economic use it on selected projects, and the remaining 29.6 percent of the organizations indicate that economic analysis is analysis in decision-making, 51.9 percent not applicable or not used in their organizations.

Profile of Surveyed

Primary duties of individuals in the survey include 8.6 percent in top management, 40.8 percent are staff officers, 16.6 percent are project officers, 15.4 percent are analysts and 18.6 percent have primary duties in other categories.

Approximately 2 percent of the 3,330 individuals reporting have doctoral degrees, 24 percent have master degrees, 37 percent have bachelor degrees, 23 percent have some college education but no college degree, and 14 percent have no more than a high school education.

Among all individuals surveyed, 2,551 (76.7 percent) had received training in economic analysis. Of those who had training, 18.6 percent had only on-the-job training, 13.9 percent had training only in civilian schools, 8.3 percent had only DoD/Agency training, and the remaining 35.9 percent had combinations of training in civilian schools, DoD/Agency training and on-the-job training.

Need for Classroom Training

Most of the individuals surveyed expressed the desire to take courses in economic analysis. Approximately 65 percent of the 3,330 individuals stated they would like to take a course covering "Basic Techniques" of economic analysis, 63 percent would like to study "Case Problems," 70.8 percent are interested in taking a course which would provide an "Overview of Economic Analysis Techniques," and 51 percent are interested in taking a course on "Advanced Techniques" of economic analysis.

Interwoven throughout the various comment sheets is the common theme that the use of economic analysis is an inherent responsibility in all DoD activities. In many programs, economic analysis techniques are being applied, but they are not recognized because the techniques have become an integral part of the operation and the identity of economic analysis has been obscured.

Some of the more vocal comments stressed the point that economic analysis is a good management tool; however, it is sometimes used to support a previous decision rather than to provide information to be considered in the decision-making process. Others persons expressed the opinion that in some cases economic analysis is merely given "lip-service" to indicate that investigative procedures have been fulfilled.

Some comments pointed out the need to improve regulations and Service/directives. More definitive guidance was suggested as a means to obtain greater application of economic analysis techniques. It was suggested that instructions should be issued in economic analysis specifiically designed for use at installation level. Another individual mentioned the need to refine the criteria for performing economic analysis to include decision-logic tables for each functional area.

One comment illustrates some of the frustration resulting from conflicts between regulations. A respondent stated that the use of economic analysis in repair/replacement considerations is impossible due to a conflict between regulations. One regulation establishes a maximum repair expenditure of 70 percent of replacement costs. Under many conditions the application of the other regulation will not yield a savings/investment ratio greater than 1 percent; yet the repair cost would exceed 70 percent of the replacement cost. Under these circumstances, replacement could not be justified nor could the respondent proceed to obtain repair and he was placed in an untenable situation.

The analysis techniques of DoD Instruction 7041.3 are considered to be helpful, but some confusion is evident between their applicability compared with other techniques such as cost comparison studies performed under directives.

Another factor which might be addressed in the directive is the source of the cost data to be used; for example, the GSA catalog was suggested as a possible source for cost data.

One of the most important requirements now and in the future is for trained personnel to do economic analysis-type work. Some efforts are being made to provide seminars and also to present classes on the use of economic analysis techniques.

The Defense Economic Analysis Handbook was described as one of the most useful publications on economic analysis. That handbook is being used as a basic text in several seminars.

Two-Day Meeting

Economic Analysis Symposium Set for May

A two-day symposium on Economic Analysis and Program Evaluation will be held in the Washington area on May 20-21, 1974.

The Defense Economic Analysis Council (DEAC), in conjunction with the National Council of Associations for Policy Sciences, will sponsor the meeting.

Terence E. McClary, the Assistant Secretary of Defense (Comptroller) has suggested that the symposium stress:

- Field participation.
- Workshops that address the application of techniques to current managerial problems.

These suggestions will be followed. Tentative workshop topics include:

- The Application of Economic Analysis to Evaluation of Training Programs.
- Benefit/Output Measurement—What is it? How can it be done?
- Economic Analysis in Transportation.
- Economic Analysis of Automatic Data Processing (ADP) Systems.
- Economic Analysis of Energy Sources at the Installation Level.

Announcements on invitations and registration should be forthcoming in early March. Officers and civilian employees at the installation level and field command level who are resopnsible for management decisions should be interested in attending. Further information may be obtained from the DEAC Symposium Committee Chairman Dr. T. A. Smith, Assistant Comptroller for Economic Policy and International Programs (OACA-EP), Room 3A724, The Pentagon, Washington, D.C. 20301.

Why DoD Needs Economic Analysis and Program Evaluation

By
Colonel Vincent J. Klaus, USA
Office Secretary of Defense, DEAC Advisor

The titles and definitions established by the instruction are useful to persons closely and frequently involved with its implementation; however, for purposes of introduction, it is preferable to establish synonyms. These synonyms, hopefully, will act as a memory device and will further serve to show the close relationship between these forms of analyses. Accordingly, economic analysis may be called pre-expenditure analysis and program evaluation called post-expenditure analysis. Both forms of analysis serve the same master and differ only in the source of data and time of analysis.

Before getting further into the requirement, an understanding of these analyses is appropriate.

Economic analysis (pre-expenditure analysis) has been downgraded as "common sense made difficult," but of course we must beware of common sense. It is a misleading term. Common sense disagreed with Columbus and maintained that the world was flat. It also argued that the sun revolved around the world. Common sense is often just about as common as it can get and may not make sense at all.

So, I prefer the DoD instruction's definition of economic analysis: "A systematic approach to the problem of choosing how to employ scarce resources and an investigation of the full implications of achieving a given objective in the most efficient and effective manner."

This is the scientific method, an orderly approach to the decision-making arena. Allow me to stress "approach." A person performing an analysis should not reach a decision. His purpose is to recommend one. A good analysis is characterized by the following procedures. Steps 1 to 6 are arranged in what we think is the best order of occurrence. Steps 7 to 9 may or may not be applicable. If used, you can perform them as appropriate.

1. Objectives—The objectives should be stated in terms of a mission or goal and should justify the expenditure of resources. Avoid basic or intermediate output descriptions. For example, if the objective is to provide a secure, climate controlled, working space for electronic equipment with adequate access to utilities, users, and data, the objective should not be to construct an ADP center, which might rule out modification of existing facilities or rental of space.
2. Assumptions—Input data that is not validated or documented is an assumption. Assumptions should be identified, collated and presented as such to facilitate review by the decision maker.
3. Developing alternatives—Alternative courses of action should not only be identified but those that indicate feasibility should be developed in sufficient detail to permit proper consideration by the decision maker. The course of action recommended by the analyst may not be acceptable to the decision maker. Development of alternate courses of action may provide support for the recommendation of the analyst but will also permit the decision maker to make his own selection, should the recommended course of action be unacceptable.
4. Cost analysis—In brief, the costs of each alternative should be exhaustive but "sunk costs" should not be included. The costs should be considered on a cash flow basis for each year. Costs are assumed to be incurred uniformly throughout each year. Present value techniques

DEAC—Members of the Defense Economic Analysis Council are, from left, Col. Vincent J. Klaus, USA, Office of the Secretary of Defense, DEAC advisor; Lt. Col. Norman L. Merritt, USAF, OSD, DEAC advisor; T. A. Smith, 1st DEAC chairman; Capt. L. H. Thiel, immediate past DEAC chairman; I. W. Seidel, present DEAC chairman; Col. Edmund W. Edmonds Jr., 2nd DEAC chairman; and E. J. Gerhard, Navy member.

will be employed. The Comptroller's office can be of material assistance in this area.

5. Benefit/output analysis—Here we describe the products or services of the project objective. Whenever possible they should be quantified.
6. Ranking alternatives—There are three categories of cost effective analyses:

   Category I Equal Output/Unequal Cost; Category II Unequal Output/Equal Cost; Category III Unequal Output/Unequal Cost.

   The most used category is the first and care must be taken during the Benefit/Output Analysis phase to insure that the project is truly indifferent with respect to the outputs of the alternatives.
7. Risk/uncertainty analysis—To be used whenever the conditions warrant it.
8. Constraints—Limitations on the analysis should be identified and collated in the analyses to permit rapid check of the impact of an environmental change.
9. Sensitivity analysis—The analysis should contain a test of the sensitivity of the results of any factor which may significantly impact on the project.

Now if this analysis is done before the commitment of funds, it is an economic analysis (pre-expenditure) and the costs and benefits are a forecast. When the analysis is done after initiation of a project (post-expenditure) it is a program evaluation and the data used will include actual performance records.

To summarize, the two types of analysis (pre- and post-expenditure) differ only in when they are performed in relation to project life and to some extent in the data used. There is another type of analysis which is reportedly widely used, the post-decision analysis used to support a request for funds after a decision is reached by hip shooting. This type of operation will probably increase the "brain drain" from the Armed Forces to industry.

The requirement as promulgated by the Defense Instruction, covers analysis of almost all proposed programs, projects and activities as well as periodic analysis of ongoing activities. A formidable task! But it is overcome piecemeal, like eating the steer a steak at a time. Upon closer examination, we find that many other issuances and forms of analysis are at work on the problem.

Analysis is called for by a host of other instructions, 7040.4 implements OMB Circular A-104 calling for analysis of commercial or industrial activities, OMB Circular A-54 is reflected in DoD Directive 4105.55 which is now under revision. There are also all the analyses called for by the DSARC, Budget Review Procedures, described in 7110-1-M, and other issuances.

Isn't this redundancy? First look at the charter and then consider concepts.

Our charter, 7041.3, allows for several exceptions, viz:

- When the minimum level of effort would not be justified by the possible savings derived from the analysis;
- Where other Instructions or issuances prescribe replacement criteria or equipment tradeoff standards;
- Where the requirements computations are based on an analysis as called for by the Instruction; and
- Where there is no choice because of environment, legislation, or prior irrevocable management decisions.

Now to refute the charge of redundancy mentioned above by examining the DoD concept of analysis. Quite simply put, DoD is interested in better decisions not in the quantity or type of analyses performed. We just don't know of a way short of omniscience to achieve better decisions except by analysis. I trust you'll agree that omniscience is too rare a quality to rely on. What instruction is followed is not important. Good analysis leads to good decisions, and good decisions are the goal. There is no reporting system involved. If you don't like the suggested formats, develop your own. If you do a good analysis, pre- or post-expenditure under

Why Program Evaluation?

"Increased emphasis will also be placed on program performance. Programs will be evaluated to identify those that must be redirected, reduced or eliminated because they do not justify the taxes required to pay for them. Federal programs must meet their objectives and cost must be related to achievements."

Richard Nixon
President of the United States,
Budget Message,
Fiscal Year 1974

another aegis, well and good, but make sure it's complete, valid, and accurate.

To complete the picture, it is appropriate to briefly examine some of the more common pitfalls in benefit analysis which is considered the weakest area. The first is to confuse benefits and cost savings. This error has a history of occurrence in automatic data processing (ADP) analyses. Probably because ADP people think of their systems as a means of cutting costs. Cost savings, the difference in cost between one alternative and another, may well be the basis for decision but they should not be confused with the output, product, or benefit of a course of action. The cost saving is reflected in the differential cost of alternatives. It does not belong on the benefit side of the equation, cost—process—benefit. The benefit or output should justify the existence of the process; it should reflect the basic mission of the organization. Accordingly, it follows that, if cost saving is a benefit, then cost saving is the reason for the existence of the system and greatest cost savings can be achieved by eliminating the entire system. The benefit must be found in the product or service of the ADP system.

DoD Photo

MEETING—U.S. Navy Captain S. D. Frost, Executive Assistant to Assistant Secretary of Defense (Comptroller) Terence E. McClary, left, and M. H. Baker, Deputy Assistant Secretary of Defense, Systems Policy and Information, discuss economic analysis during a DEAC meeting.

Another common error, and it may be a deliberate error, is the "equal benefit" escape clause. It has already been shown that analyses may be divided into three categories. One way of avoiding the problem of benefit measurement is to set the benefits as equal and use category one, the least cost analysis. To establish equal benefit, the analyst, and more important his decision maker, must be indifferent to the benefit offered by the alternatives.

If the decision maker is not indifferent, if there is significant difference between the benefits offered by alternative courses of action, the least cost recommendation may well be subjected to a good deal of fire. Unfortunately, this usually discredits the analytical concept rather than the analyst who should, in justice, receive the cudgelling.

An example of this sort of problem is the argument that analysis is a faulty procedure because it always recommends a modified or rebuilt system instead of the development of a new system. If the two alternatives offer equal benefits (production rate, reliability, responsiveness) the study is quite proper in recommending a modified or rebuilt system. However, if it can be shown that the new system offers a significant upgrade of capabilities, the least cost category is at fault. Use of the unequal cost-unequal benefit would enable the analyst to identify the increased capability and the cost of such increase. The decision maker would then be faced with an evaluation of the increased cost against the increased capability.

When measuring benefit, most analysts at one time or another fall into the error of using spurious measures. In the search for something to count or to measure and record, we often seize ancillary or independent activities, because they have a tangible, easily identified product. Unfortunately, these products do not always reflect the mission of the organization or may constitute a by-product. Once they are highlighted and used by management to measure performance, they become the dominant factor at the expense of proper mission accomplishment.

For example, let us assume the Department of Labor wishes to solve the unemployment problem in a mining community brought about by reduced demand, coupled with automation of the mining industry. They decide to train miners in other jobs and begin courses in radio and TV repair. They become super efficient in producing TV and radio repairmen. However, because they were concentrating on the output of these repairmen instead of concentrating on a reduction of the unemployed rolls and also because of the relative immobility of this labor segment, the result is an unhappy one. They convert a town of unemployed miners into a town of unemployed TV and radio repairmen.

Another error is worth highlighting. This is the omission of quality control. An unequivocal description or a set of specifications is necessary, if we are to insure that a productivity increase or a cost reduction is not accomplished at the expense of quality and usefulness. The obvious examples of inferior products of a tangible nature come quickly to mind, but others are recondite and can be uncovered only by care-

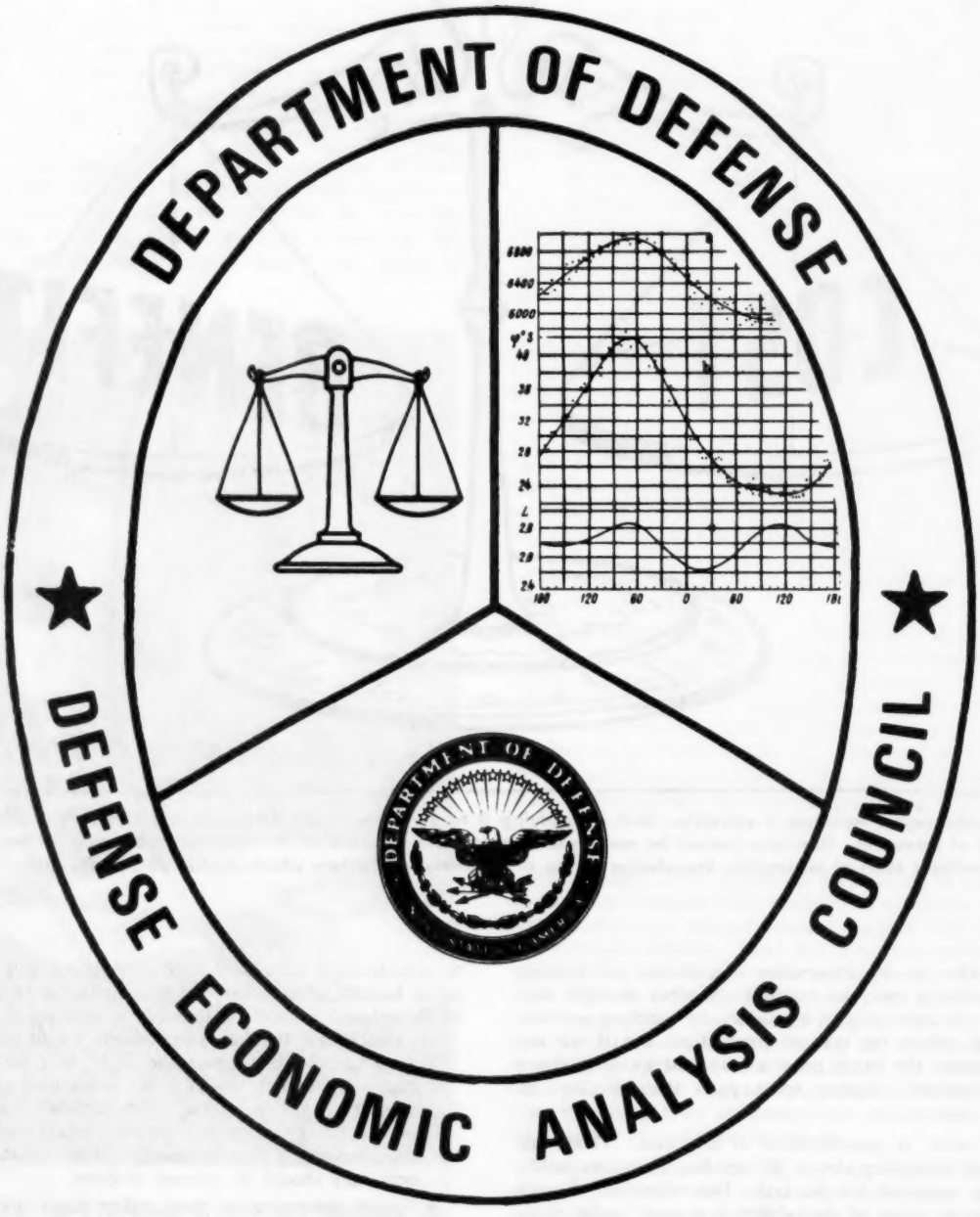
VERSATILE—Economic Analysis is versatile. DoD is applying it to a variety of problems where a choice is available before commitment of resources. Decisions cannot be made solely on a balance scale of cost/benefit analysis. Yet none should be made in a twilight zone of incomplete knowledge of the broad range of factors which impact on the situation.

ful examination or by experience. Graduates of training courses provide an excellent example. Another example may be found in the timeliness of a product, by batching production we can reduce the cost of production, but if we are producing spares the batch process may cost more in down time of equipment awaiting spare parts than it saves in production costs.

The final error is quantification at any cost. There are valid ways of measuring almost all benefits, if we can justify the resources required for the task. Quantification, if only in a ratio or an order of desirability is a most useful characteristic and should be sought, but only within the parameters of resources and of validity and accuracy. Inaccurate quantified measures can do more harm than good. We cannot permit quantification to be established as a prerequisite to consideration because it follows logically that valid qualitative benefit information will lead to decisions far superior to those based on meretricious but quantified measures.

To summarize, the following criteria might be used:

- Analyses should support the DoD goal, improved decisions. If they don't (if they waste time or if the analysts enjoy themselves with sophisticated techniques poorly supported by the validity of data, the accuracy of data or the significance of the project) they should be pruned severely.
- Benefit determination must reflect the validity and accuracy of cost data.
- Poor analyses do more harm than good. The decision maker may trust them and be lead to a decision he would normally reject.



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